OPEN PHD POSITION FOR MARIE SKŁODOWSKA-CURIE INNOVATIVE TRAINING NETWORKS (MSCA-ITN) AT CSIC

<table>
<thead>
<tr>
<th>MSCA-ITN</th>
<th>MSCA-ITN-EJD PIONEER Plasma catalysis for CO₂ recycling and green chemistry. Grant number: 813393</th>
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<tbody>
<tr>
<td>PROJECT</td>
<td>Plasma-assisted production of organic acids by reacting CO₂ with water</td>
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<tr>
<td>PhD SUPERVISOR(S)</td>
<td>Vasile Parvulescu/ Tomás García</td>
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<tr>
<td>SCIENTIFIC AREA</td>
<td>Physics, Applied Physics, Physical Chemistry, Chemistry, Catalysis</td>
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<td>HOST INSTITUTION</td>
<td>Universitatea din Bucuresti / Instituto de Carboquímica (ICB)</td>
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<td>DURATION</td>
<td>36 months</td>
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| FIXED START DATE: | Application deadline: 03/05/2019  
Start date: 02/09/2019 |
| PLANNED SECONDEMENT(S): | 2 months at CNRS-LPP with Olivier Guaitella                                                       |
| EMAIL OF THE PhD SUPERVISOR(S) | Vasile.parvulescu@chimie.unibuc.ro  
tomas@icb.csic.es |
| WEBSITE OF THE ITN-MSCA | https://www.co2pioneer.eu                                                                        |
https://www.icb.csic.es/grupo/grupo-de-investigaciones-medioambientales/ |
### Ideal Candidates

Degree and master on Physics, Applied Physics, Physical Chemistry, Chemistry, Catalysis, Chemical Engineering

Special attention will be paid to match the education of the candidate with the chosen topics, the number of previous publications or communications in conferences, mobility experience and public awareness. Because of the need for multidisciplinary approach in all the PhD topics of PIONEER, the adaptability of the candidate to different fields of science will be especially valued.

### Desirable Candidate Requirements

The eligibility criteria must be followed:
- **Early-Stage Researchers (ESRs)/fresh MSc graduates:** All candidates to be recruited in PIONEER must have worked no more than 4 years as researcher and have not been awarded any doctoral degree at the date of the employment.
- **Transnational mobility:** The ESR is required to undertake transnational mobility (i.e. move from one country to another) when taking up their appointment. Nationality is not a criterion.

The candidates must submit through the project website: [www.co2pioneer.eu/applications](http://www.co2pioneer.eu/applications) the followings:

- Bachelor and master's degree certificate and official transcript (grades)
- English language proficiency
- Curriculum Vitae/CV (with List of publications - if any)
- Reference Letter
- Motivation letter
- Proof of residence

### Benefits

- Extensive and dedicated training programme including secondments, workshops, schools and non-research oriented skills.
- Average gross salary 27000 €/year (depends on the country)
- Including living + mobility allowances. PhD tuition fees covered + research, training and network costs
**PhD PROJECT**

The main objective of this ITN project is the formation of a new generation of experts in the CO₂ valorisation using plasma-catalytic coupled processes. Intensification of CO₂ valorisation processes can contribute to the stabilization of CO₂ concentration in our atmosphere through the production of synthetic fuels that will play an important role in our transition to a 100% renewable future. Chemical and thermochemical processes are often accelerated by specific catalysts that used in combination with plasma could turn sluggish CO₂ valorisation processes feasible. The Project will be directed towards the understanding of CO₂ plasmas, their interaction with solid catalysts and fundamentals of reaction mechanisms involved with complementary formation of PhD students on soft skills, specific formation on managing, marketing and business.

**Plasma-assisted production of organic acids by reacting CO₂ with water**

A new plasma-chemical technique for CO₂ recycling and valorisation by conversion into organic acids will be studied in the University of Bucharest. The method is based on electrical discharges generated at the gas-liquid interface. To determine its future potential, investigations of the effect of reactor design, discharge characteristics, addition of catalysts etc. will be carried out, aimed at obtaining efficient and selective CO₂ conversion. Manganese-based catalysts for the production of organic acids via the conversion of CO₂ in water will be as well produced at CSIC-ICB. This project will give the ESR a strong training in synthesis, spectroscopy and homogeneous heterogeneous catalysis, together with the special concepts required for applications to fluorinated molecules.

14 more titles in the ITN
1.- Electric fields on catalyst covered dielectric surfaces under plasma exposure
2.- CO₂ dissociation for value-added products at atmospheric pressure using tailored radio-frequency and nanosecond pulsed power input
3.- Improving the energy efficiency of CO₂ conversion and activation in a microwave plasma by a combination of experiments and modelling
4.- Energy input and relaxation in atmospheric pressure CO₂ plasmas
5.- Valorization and optimization of plasma assisted CO₂ catalytic reduction of CO₂ methanation
6.- Efficient catalysts preparation for plasma-assisted CO₂ methanation
7.- Novel catalysts for plasma-assisted tri-reforming of methane
8.- Nanostructured catalysts for plasma assisted CO₂ methanation
9.- Tailoring selectivity with different plasma sources
10.- Plasma-catalytic CO₂ hydrogenation for the production of molecules for green chemistry
11.- Time-resolved detection of transient species in nanosecond repetitively pulsed discharges for CO₂ conversion
12.- Bending and stretching to promote catalysis
13.- Investigating methods to vibrationally excite CO₂ with plasma
14.- Role of vibrationally excited molecules on catalytic surfaces